

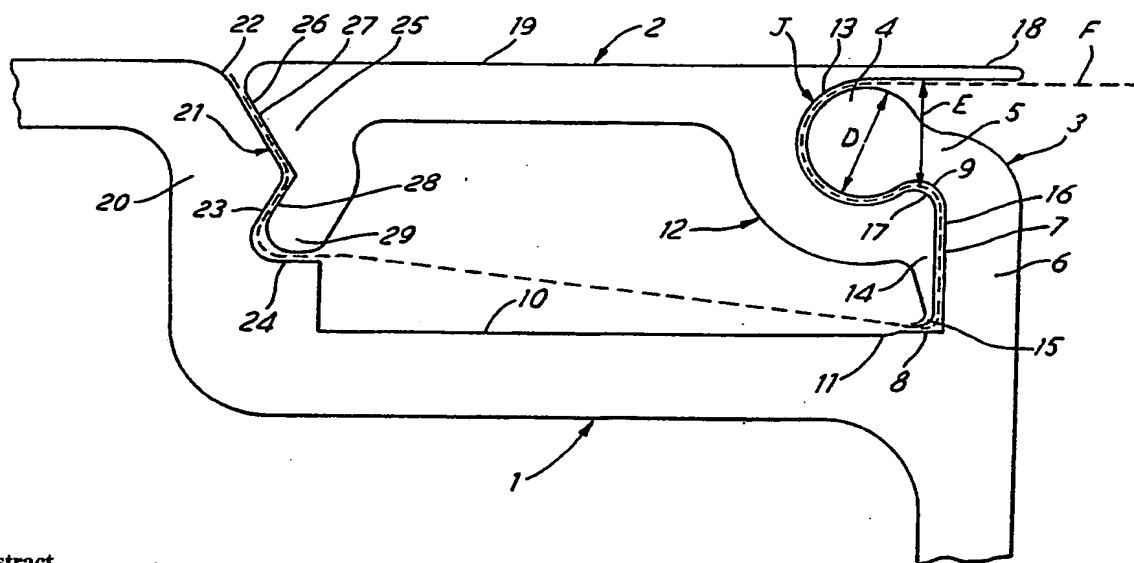
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: <b>PCT/GB84/00439</b></p> <p>(22) International Filing Date: <b>19 December 1984 (19.12.84)</b></p> <p>(31) Priority Application Number: <b>8333779</b></p> <p>(32) Priority Date: <b>19 December 1983 (19.12.83)</b></p> <p>(33) Priority Country: <b>GB</b></p> <p>(71) Applicant (for all designated States except US): <b>SERAC LIMITED [GB/GB]; Nyton Road, Aldingbourne, Chichester, West Sussex PO20 6TU (GB).</b></p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only) : <b>CHATELAIN, Michel [FR/GB]; Caledonia House, Caledonia Place, St Helier, Jersey, Channel Islands (GB).</b></p> <p>(74) Agent: <b>ROWLAND ALLSOP &amp; CO.; Black Boy Yard, 15 High Street, West Wycombe, High Wycombe, Bucks HP14 3AE (GB).</b></p>	<p>(81) Designated States: <b>AT (European patent), AU, BE (European patent), BR, CH (European patent), DE (European patent), DK, FI, FR (European patent), GB, GB (European patent), JP, LU (European patent), NL (European patent), NO, SE (European patent), US.</b></p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>	

(54) Title: A CLIP FIXING FOR PLASTICS FILM MATERIAL



## (57) Abstract

A clip fixing for retaining plastics film material comprised of a pair of channel members (1, 2) one of which (2) is held in inverted relationship within the other (1). A film of plastics material F is held by the fixing under tension, by means of the mutual interaction between the opposing profiled surfaces of side flanks of the channel members (3, 12) and (20, 25), through which the film F passes. These opposing profiled surfaces are specially designed to provide a novel means of pivotal interengagement of the two channel members (1, 2) to eventually retain the film F, which avoids resultant stress on the main support frame to which the channel member (1) is attached or integrally formed therewith, and provides an air and water-tight connection between side flanks (3, 12) and (20, 35) of the two channel members (1, 2).

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"A Clip Fixing for Plastics Film Material"

FIELD OF THE INVENTION

The present invention relates to a clip fixing for retaining plastics film material under tension.

5

BACKGROUND ART

The use of thin plastics film, as a substitute for glass, to form large areas of single or multiple glazed transparent or opaque panels is due to the new generation of highly durable plastics film material now on the market, becoming more  
10 common. Typical uses are in greenhouses, home extensions, and solar collectors.

This type of glazing has advantages over its more traditional counterpart in terms of, for example, weight and cost, and improved optical performance.

15

In most applications, the film has to be stretched over a square or rectangular support frame, and held or secured in tension across the frame at each side member of the frame.

This is accomplished by providing each side frame member with a special clip fixing in which the film can be  
20 retained under tension, and which is dynamic under load and has the capability of allowing the film to be released thereafter for replacement purposes.

A known clip fixing for this purpose is the subject of U.K. patent 1,586,247. This fixing basically comprises a  
25 pair of channel members, one of which is integral with a respective side member of the support frame, and having internally profiled side flanks which are provided to cooperate with corres-



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pondingly externally profiled side flanks of the other freely mountable channel member, when positioned in inverted locked relationship therein.

To retain the film in this clip fixing, it is first  
5 passed over the lower extremities of the flanks of the freely mountable channel member and initially tensioned in this position. Then the freely mountable channel member is moved into the inverted locked position by relative rotation on a complementarily curved profile flank extremity of the other  
10 channel member, so that the film is eventually retained between the cooperating profiles of the opposing flanks of the two channel members.

When it is desired to secure film material having a large variation in thickness flexibility and hardness, it is  
15 difficult, with this known clip fixing, to deform the film when fixing, in order to constrain it to assume the shape of the complementary curved cooperating side flanks of the channel members. Consequently attachment and removal of thick films in particular, is a difficult process.

20 In addition the clip fixing of the prior art, although providing excellent film retaining qualities for a narrow range of thickness materials within certain limitations, does not provide consistent water-tight, or air-tight, security at the retention point to the support frame, which is  
25 an essential requirement for instance in roofing applications.

Another problem with the prior art, is the tendency for the corners of the support frame to part when the film is

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stressed by heat shrinkage or otherwise, this has been known to create problems with water tightness, and special design measures have to be taken to compensate for this effect.

A further area which requires to be improved in the prior clip fixing mentioned above, is in relation to its contribution to the reduction of the life span of the plastics film over and above that due to normal process of ageing. This accelerated ageing of the plastics film has been found to occur in the region where the film exits the clip fixing, and in particular where the film passes over those surface portions of the clip fixing which are exposed to direct radiation and thus under the influence of high temperatures and ultra-violet radiation.

Under these effects those surface portions of the clip fixing heat up and degrade the adjacent film material to an accelerated degree compared with other exposed portions of the film.

#### SUMMARY OF THE INVENTION

It is an object of the present invention to overcome these difficulties by providing a clip fixing for retaining plastics film material under tension which in particular provides a water-tight connection between the fixing parts and the film, and which so distributes the forces upon it when retaining the film under tension that deformation of the support frame member containing the clip fixing does not occur, or at least not to the same extent as hereinbefore, both these achievements being possible irrespective of the thickness of film used.

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According to the invention there is provided a clip fixing for retaining plastics film material under tension in a support frame comprising a first elongate channel member integral with or attachable to the support frame or a respective support frame member, a second elongate channel member retainable in assembly in the first channel member in inverted relationship to secure the film between opposing surface profiled side flanks of the channel members characterised in a pivot and socket joint formed between opposing flanks of the first and second channel members for retaining film, and permitting the second channel member to swivel from a disengaged position to an engaged position in said inverted relationship in the first channel member, a first lever on the second channel member extending from one side of said joint and arranged to set up tension in the film between the joint and a base member of said first channel member as the second channel member is moved to said engaged position, and a second lever on the second channel member extending from the other side of said joint to bear against the retained film entering the joint so that imposed tension in the film constrains the second channel member to maintain the engaged position.

The advantage of this arrangement is that the action of the two levers, in conjunction with the tensioned film, operating around the pivot and socket joint, provides an air and water-tight connection between the two channel members of the clip fixing, in contrast to the prior art.

The second channel member may be provided with .

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resilience, and the entrance to the socket made restrictive with respect to the pivot, so that in the disengaged position of the second channel member the film can be initially held between the cooperating surfaces of the joint, by force-fit  
5 engagement of the pivot in the socket.

The film thereafter passes around the free end of the first lever, so that as the second channel member is rotated into the engaged position, it is stretched and tensioned along the length of the first lever by the action of the free end of  
10 the lever physically yielding, due to its resilience, to pinch the film against the base member of the first channel.

The manner also in which the clip fixing of the invention retains the film under tension results in improved distribution of those tension forces acting to deform the fixing  
15 along its length. In particular stress is concentrated solely along the swivel joint.

The invention will now be described in further detail. The description will make reference to the sole accompanying drawing which is a cross-sectional view of a preferred  
20 form of clip fixing according to the invention for retaining and tensioning thin plastics film.

#### BEST MODE OF CARRYING OUT THE INVENTION

The clip fixing for retaining and tensioning plastics film F shown in the drawing, comprises a first  
25 channel member 1, usually part of a support frame across which the film is tensioned, and a second inverted channel member 2 which is able to engage the channel member 1 as shown to retain the film F under tension.

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The channel member 2 is resiliently formed either by being constructed entirely of a plastics material for example, or having a metal core of aluminium ribbon for instance surrounded by a coating of plastics material, this latter construction being possible by known simultaneous extrusion techniques.

One flank 3 of the channel member 1 is provided with an elongate rib 4, which protrudes towards the interior of the channel member 1. The rib 4 is part-circular in section, the circle being incomplete to the extent to form a connecting neck 5 to the wall portion 6 of the remainder of the flank 3.

The interior surface of the wall portion 6 has a straight section 7 between the base portion 8 of the channel 1 at right angles to it, and an inwardly curved return portion 9 running out into the circular surface of the rib 4.

The base portion 8 of the channel 1 is closer to the rib 4, than the remainder of the base 10, to form a radiused indent 11.

The flank 12 of the channel member 2 is provided with a socket 13 complementary to the rib 4, the socket 13 having an entrance E of lesser dimension than the diameter D of the rib 4, so that due to the resilience of the channel 2, the socket 13 can be inserted over the pivot by a snap-fit action, so forming a swivel joint J for the channel 1 on the channel 2, with the film F tightly held between their cooperating surfaces.

A lever arm 14 extends to one side of the socket 13, the lever arm 14 tapering to a resiliently deformable point



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15, and having a straight inner surface portion 16 between the point 15, and a curved return elongate rib portion 17 to the interior surface of the socket 13. The curved return 17 is complementary to the curved return 9 in flank 3.

5           A further arm 18 extends to the other side of the socket 13, the arm 18 being a continuation of the line of the base 19 of inverted channel member 2.

          The other flank 20 of channel member 1 has a profiled recess 21 on its inner surface having a first surface  
10   constituting an insertion ramp 22 sloping inwardly with respect to the interior of channel member 1, and a second surface constituting a locking ramp 23 sloping outwardly with respect to that interior finally to terminate in a step portion 24 in the inner surface of the flank 20.

15           The flank 25 has its outer surface complementarily profiled to that of recess 21 constituted by a first surface 26 complementary to insertion ramp 22, and a second surface 27 complementary to locking ramp 23, and a bulbous tip 29 substantially complementary to the step portion 24.

20           In the accompanying illustration, the channel member 1 is shown in the engaged inverted position in the channel member 2, to retain the film F under tension between the profiled flanks (3, 12) and 20, 25).

          To reach this position, the film F is initially  
25   pinched between the cooperating surface of the swivel joint J by snap-fit insertion of the socket 13 on rib 4, with the flanks (20, 25) out of engagement, and stretched across the ends of the

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flanks 12, and 25, namely over point 15 and bulbous tip 29.

The channel member 2 is then rotated anti-clockwise on the swivel joint J, until the bulbous tip 29 contacts the insertion ramp 22, thereby holding the film F tightly between egress of the film F from the cooperating surfaces of the joint J and over the point 15 of lever arm 14, and the tip 29.

Due to resilience of the channel member 2, the tip 29 yields upon further anti-clockwise rotation to allow eventual movement (corresponding to the engaged position of the fixing) into the cooperating step portion 24, and in this position, the film is then gripped between locking surfaces (23, 28), and ramp faces (22, 27).

During this movement, the tip 15 of lever arm 14 follows the arc of a circle whose centre of curvature is at the centre of the circular pivot 4, all the time tensioning the film F along its length, until in the engaged position of the fixing, the return 17 engages in the return 9, and the surface 16 of lever arm 14 is held hard against the surface 7 of flank portion 6.

The film F is pinched tight in this position between the point 15 and the base portion 8, and to this end, the point 15 resiliently yields as the lever moves into its final position, so setting up resilient stress at the end of the lever to "crush" or "pinch" the film into contact with the portion 8 so ensuring a water-tight seal.

The radiused indent 11, as will be appreciated,

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assists in facilitating movement of the lever into its final position by reducing resistance to bending of the tip 15.

In the final engaged position of the clip fixing as shown, the lever arm 18 bears on the tensioned film F.

5           As mentioned, in the prior art, the tensional forces set up across the support frame are such as to cause deformation of the frame support members and special compensatory features have to be introduced to avoid this. These involve incorporating special corner stiffeners, and leaving tolerance  
10 gaps at the corner joints which close up after the tensioning process is complete.

With the present invention, the stress set up in the frame members is concentrated solely at the swivel joints of the clip fixing, and no stress is exerted in the engaged  
15 position of the fixing, along the other engaging flanks of the fixing, which are therefore simply necessary to position the film prior to tensioning by means of the other flanks incorporating the swivel joint.

It is also to be noted, that the arm 18 performs an additional service in the form of a radiation shield in that it  
20 protects the exposed surfaces of the joint J from harmful radiation which would otherwise cause excessive degradation of the plastics film.

The clip fixing of the invention moreover, in contrast to the prior art, is capable of handling film material of  
25 varying thickness hardness and flexibility due to the leverage action attainable by means of lever arm 14 in cooperation with the swivel joint J.

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## CLAIMS

1. A clip fixing for retaining plastics film material under tension in a support frame comprising a first elongate channel member integral with or attachable to the support frame or a respective support frame member, a second elongate channel member retainable in assembly in the first channel member in inverted relationship to secure the film between opposing surface profiled side flanks of the channel members, characterised in a pivot and socket joint formed between opposing flanks of the first and second channel members for retaining film, and permitting the second channel member to swivel from a disengaged position to an engaged position in said inverted relationship in the first channel member, a first lever on the second channel member extending from one side of said joint and arranged to set up tension in the film between the joint and a base member of said first channel member as the second channel member is moved to said engaged position, and a second lever on the second channel member extending from the other side of said joint to bear against the retained film entering the joint so that imposed tension in the film constrains the second channel member to maintain the engaged position.
2. A clip fixing as claimed in claim 1 wherein the pivot and socket joint is constituted by a bulbous rib on one side flank of the first channel member which engages a complementary recess on an opposing side flank of the

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second channel member.

3. A clip fixing as claimed in claim 2 wherein said recess has a restricted entrance with respect to said bulbous rib such that engagement of the pivot and socket joint is possible by a snap-fit action.
4. A clip fixing as claimed in claim 3 wherein the inner surface of the said one flank of the first channel member between said bulbous rib therein and the said base member of the first channel member, is complementary to the opposing surface of said first lever in the second channel member, these two said surfaces coming together in said engaged position of the fixing to retain the film therebetween.
5. A clip fixing as claimed in claim 4 wherein said first lever terminates in a tip portion which yields upon contact with said base member of the second channel member during said swivel movement to said engaged position thereby to provide gripping means for said film passing therebetween.
6. A clip fixing as claimed in claim 5 wherein the base surface of said first channel member is provided with a radiused indent adjacent said base member, which reduces resistance to the said yielding of said tip portion as the second channel member moves to said engaged position.
7. A clip fixing as claimed in any preceding claim wherein the inner surface of the other side flank of the first channel member is constituted by an insertion ramp sloping

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inwardly with respect to the interior of said second channel means, and a locking ramp sloping outwardly with respect to that interior, the opposing surface of the other side flank of the second channel member having surface portions complementary to said insertion and locking  
5 ramps which cooperate in the engaged position of the fixing to grip the film therebetween.

8. A clip fixing as claimed in claim 7 wherein said locking ramp defines a step recess in said inner surface of the other side flank of the first channel member into which  
10 engages a complementary tail or tip of the opposing side flank of the second channel member and between which the film is tightly retained, said step recess being above said base member of the first channel member with respect  
15 to an inner base surface thereof.

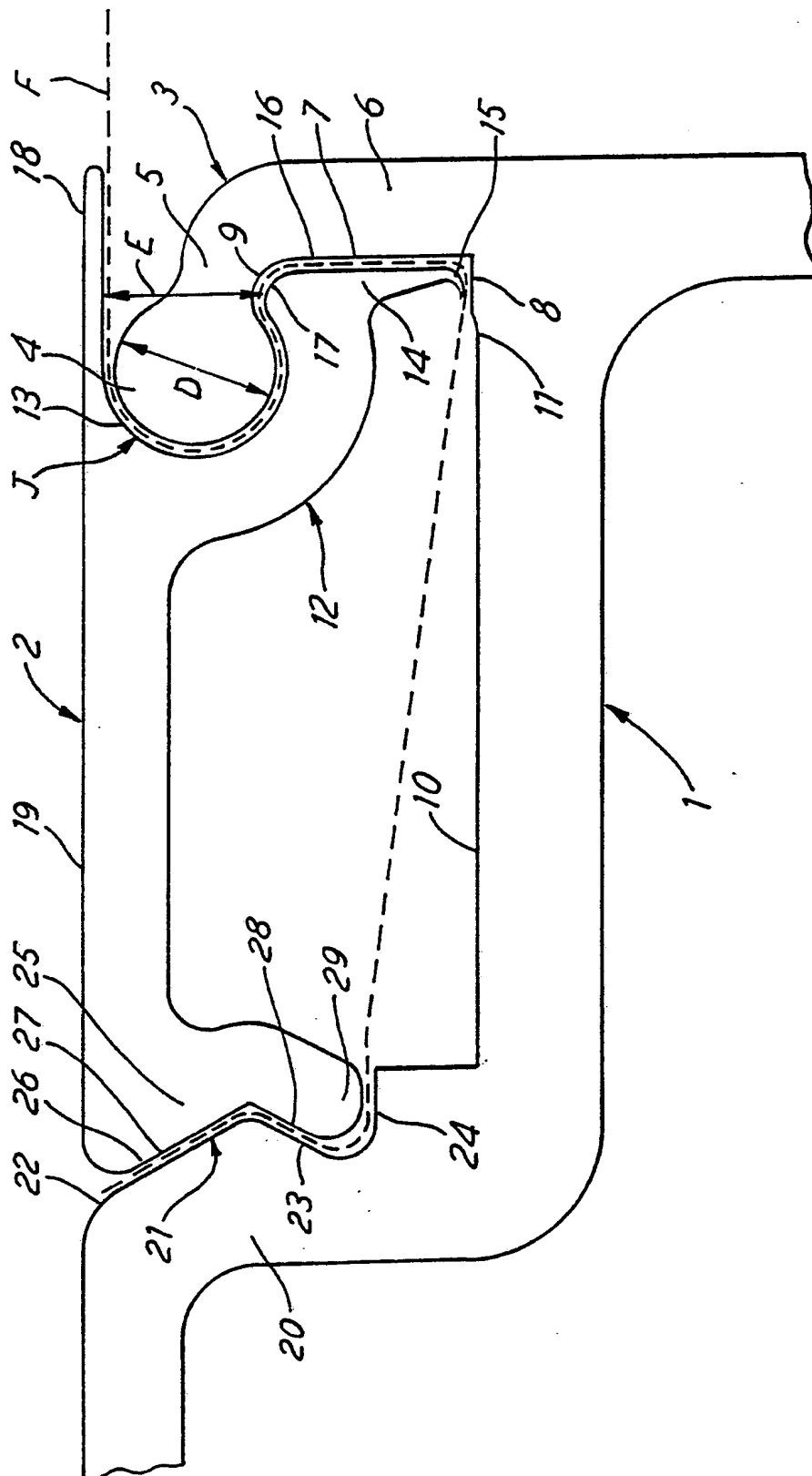
9. A clip fixing as claimed in any preceding claim wherein said second channel member is constructed of a plastics material over a metal core of aluminium ribbon.

10. A clip fixing for retaining plastics film material under  
20 tension in a support frame comprising a first elongate channel member integral with or attachable to the support frame or a respective support frame member, a second elongate channel member retainable in assembly in the first channel member in inverted relationship to secure  
25 the film between opposing surface profiled side flanks of the channel members, characterised in a pivot and socket joint formed between one set of opposing flank surfaces

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- of the first and second channel members for clamping the film, and to permit the second channel member to swivel from a disengaged position to an engaged position in said inverted relationship, the remainder of the flank of said second channel member extending from said joint constituting means which acts progressively to clamp the film under tension between said joint and the base of said first channel member as the second channel member moves to said engaged position, and complementary formations on the other set of opposing flank surfaces of the first and second channel members which provide for snap-fit engagement as the second channel member swivels to said engaged position on said joint to clamp the film under tension between said formations and said one set of opposing flank surfaces.
11. A clip fixing as claimed in claim 12 wherein an element of the second channel member bears against the retained film entering the joint in said engaged position of the fixing so that imposed tension in the film constrains the second channel member to maintain the engaged position.

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SUBSTITUTE SHEET



# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 84/00439

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) * According to International Patent Classification (IPC) or to both National Classification and IPC IPC <sup>4</sup> : F 16 B 5/06; E 04 H 15/64																				
<b>II. FIELDS SEARCHED</b> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Minimum Documentation Searched <sup>7</sup></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 25%; border-bottom: 1px solid black;">Classification System</th> <th style="border-bottom: 1px solid black;">Classification Symbols</th> </tr> <tr> <td style="padding: 5px; vertical-align: top;">IPC<sup>4</sup></td> <td style="padding: 5px; vertical-align: top;">F 16 B; E 04 H; B 44 C; F 24 J</td> </tr> </table> <div style="text-align: center; border-top: 1px solid black; border-bottom: 1px solid black; margin: 5px 0;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched *</div>			Classification System	Classification Symbols	IPC <sup>4</sup>	F 16 B; E 04 H; B 44 C; F 24 J														
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IPC <sup>4</sup>	F 16 B; E 04 H; B 44 C; F 24 J																			
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT *</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 10%; border-bottom: 1px solid black;">Category *</th> <th style="border-bottom: 1px solid black;">Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup></th> <th style="width: 15%; border-bottom: 1px solid black;">Relevant to Claim No. <sup>13</sup></th> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">US, A, 4267876 (BLOOMFIELD) 19 May 1981, see figures 2-4; column 1, line 44 - column 2, line 52; claim 1; abstract --</td> <td style="text-align: center; vertical-align: top;">1,2,7,9-11</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">US, A, 3803671 (STUPPY et al.) 16 April 1974, see column 2, line 5 - column 4, line 8; figures 3,4 --</td> <td style="text-align: center; vertical-align: top;">1,5,6,10</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">DE, B, 2552776 (PFLEGER) 3 February 1977, see figures 1,2; claim 1 --</td> <td style="text-align: center; vertical-align: top;">1,10</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">EP, A1, 0006844 (FEILHAUER) 23 January 1980, see figure 1; claims 1-3 --</td> <td style="text-align: center; vertical-align: top;">1,2,4,10</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">A</td> <td style="padding: 5px;">GB, A, 1586247 (BRAVE) 18 March 1981, see figure 1; claims (cited in the application) -----</td> <td style="text-align: center; vertical-align: top;">1,2,4,8,10</td> </tr> </table>			Category *	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>	A	US, A, 4267876 (BLOOMFIELD) 19 May 1981, see figures 2-4; column 1, line 44 - column 2, line 52; claim 1; abstract --	1,2,7,9-11	A	US, A, 3803671 (STUPPY et al.) 16 April 1974, see column 2, line 5 - column 4, line 8; figures 3,4 --	1,5,6,10	A	DE, B, 2552776 (PFLEGER) 3 February 1977, see figures 1,2; claim 1 --	1,10	A	EP, A1, 0006844 (FEILHAUER) 23 January 1980, see figure 1; claims 1-3 --	1,2,4,10	A	GB, A, 1586247 (BRAVE) 18 March 1981, see figure 1; claims (cited in the application) -----	1,2,4,8,10
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<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p> </div> </div>																				
<b>IV. CERTIFICATION</b> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of the Actual Completion of the International Search 25th April 1985</td> <td style="width: 50%; border-bottom: 1px solid black; padding: 5px;">Date of Mailing of this International Search Report <b>03 JUN 1985</b></td> </tr> <tr> <td style="border-bottom: 1px solid black; padding: 5px;">International Searching Authority EUROPEAN PATENT OFFICE</td> <td style="border-bottom: 1px solid black; padding: 5px;">Signature of Authorized Officer  G.L.M. Kraydenberg</td> </tr> </table>			Date of the Actual Completion of the International Search 25th April 1985	Date of Mailing of this International Search Report <b>03 JUN 1985</b>	International Searching Authority EUROPEAN PATENT OFFICE	Signature of Authorized Officer  G.L.M. Kraydenberg														
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ANNEX TO THE INTERNATIONAL SEARCH REPORT ON

INTERNATIONAL APPLICATION NO. PCT/GB 8400439 (SA 8606)

This Annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 28/05/85

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A- 4267876	19/05/81	CA-A- 1122788	04/05/82
US-A- 3803671	16/04/74	None	
DE-B- 2552776	03/02/77	None	
EP-A- 0006844	23/01/80	None	
GB-A- 1586247	18/03/81	FR-A- 2385930	27/10/78
		DE-A, C 2812665	12/10/78
		JP-A- 54000152	05/01/79
		AU-A- 3449978	04/10/79
		CH-A- 620971	31/12/80
		US-A- 4316308	23/02/82
		AU-B- 519233	19/11/81

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